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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/586,376

06/01/2007

Bhanu Prakash K.N.

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EXAMINER

FONTENOT, NIGEL RAI

ART UNIT

PAPER NUMBER

3768

MAIL DATE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/586,376

**Applicant(s)**

K.N. ET AL.

**Examiner**

NIGEL FONTENOT

**Art Unit**

3768

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/ISD)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date 5/31/2007

### DETAILED ACTION

This action is responsive to the application filed on July 13, 2006. Preliminary amendment filed July 13, 2006 has been entered. Claims 1-29 are pending.

#### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-6, 8-18 and 24-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thesen (US 2002/0130660).

4. Addressing claims 1, 11, 14-15, 24-25, and 29, Thesen discloses a method comprising: (a) determining a candidate sagittal direction for a brain image, said brain image defined by brain volume data in a three-dimensional space associated with first, second and third directions, said first, second and third directions being orthogonal to each other (see paras 42-43), said candidate sagittal direction being the closest

direction of said first, second and third directions to an actual sagittal direction, said determining said candidate sagittal direction (see paras 42-43) comprising: defining a first three-dimensional volume of interest of said brain image (see fig. 1 and paras 42-43); obtaining brain volume data in said first volume of interest for a first plurality of points in said first direction (see fig. 1 and paras 32-34); defining a second three-dimensional volume of interest of said brain image; obtaining brain volume data in said second volume of interest for a second plurality of points in said second direction (see fig. 1 and paras 32-34); defining a third three-dimensional volume of interest of said brain image; obtaining brain volume data in said third volume of interest for a third plurality of points in said third direction (see fig. 1 and paras 32-34); determining a measure for each point of said first, second and third plurality of points (see paras 32-34); and determining from the measured data which of said first, second and third directions is said candidate sagittal direction with a candidate plurality of points associated therewith (see paras 37-40) , and identifying orientation of each plane (see figs. 4-5). Thesen discloses registering and subtracting the data, but does not explicitly disclose plotting the measured data, however, it would have been obvious to one of ordinary skill in the art to plot the data to have a better visualization of matches for registration. Thesen does not explicitly disclose using slices, however it would have been obvious to one of ordinary skill in the art to use slices since Thesen discloses in para 55 that: "In normal magnetic resonance imaging, for example with a turbo spin echo method based on a multi -slice technique, whereby a three-dimensional image dataset is built up slice by slice, positional changes of the imaged region from slice

registration to slice registration can be detected and correspondingly corrected according to the inventive method. In another embodiment, the registration of a two-dimensional slice can also be interrupted once or repeatedly in order to detect positional changes that have potentially occurred with the inventive method. This is also true for volume techniques."

5. Addressing claims 2-6, 8-10, 12-13, 16-18, and 26-28, Thesen matches and subtracts each iteration of data along the three orthogonal directions to provide a best fit. Thesen does this by generating large 3D image datasets and subtracts each set from one another and even if there is a slight error or non-match, the process is done again (see paras 31-32 and 39-40). Thesen first using a distance function that indicates the maximum coincidence with a value (magnitude or energy) as close as possible to zero serves as the criterion that the maximum coincidence has been achieved (see paras 33-35). Thesen performs the method using the Nelder-Mead method (see paras 36-37). It would have been obvious to one of ordinary skill in the art to plot the data to have a better visualization of matches for registration.

6. Claims 7 and 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thesen (US 2002/0130660), in view of Soman et al. (Rigid Registration of Echoplanar and Conventional MR Images by Minimizing the Kullback-Leibler Distance).

7. Addressing claims 7 and 19-23, Soman does not explicitly disclose measuring entropy or measuring a first probability distribution for each slice or set of data. However, Soman discloses using that MRI registration can be done by minimizing the Kullback-Leibler Distance and finding entropies along different directions of slices (see "Abstract" and "Introduction" sections). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Thesen by incorporating the registration method, as taught by Soman, to minimize error when measuring MRI signals and repeating.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NIGEL FONTENOT whose telephone number is (571)270-7032. The examiner can normally be reached on Monday-Friday (7:00a-4:00p).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 571-272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/N. F./  
Examiner, Art Unit 3768

/Long V Le/  
Supervisory Patent Examiner, Art Unit 3768